

Title of Invention: RUSH HOUR MODELING FOR
ROUTING AND SCHEDULING
Inventor(s) Name: Heaps, et al.
Attorney Docket No.: 018360/260844

Sample Set of Modified Rush Hour Travel Speeds

| Geographic Area/Road Segment | Normal Travel Speed | Travel Speed during Time Window #1 | Travel Speed during Time Window #2 | Travel Speed during Time Window #3 |
|--|---------------------|------------------------------------|------------------------------------|------------------------------------|
| Road 1 in Area 1 | 45 mph | 31.5 mph (30% slower) | 36 mph (20% slower) | 31.5 mph (30% slower) |
| Road 2 in Area 1 | 50 mph | 35 mph (30% slower) | 40 mph (20% slower) | 35 mph (30% slower) |
| Road Segment X | 30 mph | 20 mph (30% slower) | 0 mph (Travel restriction) | 20 mph (30% slower) |
| Road Segment Y | 65 mph | 45.5 mph (30% slower) | 0 mph (Travel restriction) | 45.5 mph (30% slower) |
| All Areas and Roads to which no new traffic rules were defined to apply. | Normal Speed | Normal Speed | Normal Speed | Normal Speed |

FIG. 1

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Travel Matrix for "Normal" Traffic Conditions

| | Location 1 | Location 2 | Location 3 | Location 4 |
|-------------------|------------|------------|------------|------------|
| Location 1 | ---- | 10 minutes | 15 minutes | 20 minutes |
| | | 2 miles | 3 miles | 4 miles |
| Location 2 | 10 minutes | ---- | 5 minutes | 10 minutes |
| | 2 miles | | 1 mile | 2 mile |
| Location 3 | 15 minutes | 5 minutes | ---- | 5 minutes |
| | 3 miles | 1 mile | | 1 mile |
| Location 4 | 20 minutes | 10 minutes | 5 minutes | ---- |
| | 4 miles | 2 miles | 1 mile | |

FIG. 2A

**Travel Matrix for a Particular Time Window
with a 20% Slower Speed Variation**

| | Location 1 | Location 2 | Location 3 | Location 4 |
|-------------------|------------|------------|------------|------------|
| Location 1 | ---- | 15 minutes | 18 minutes | 24 minutes |
| | | 3 miles | 3 miles | 4 miles |
| Location 2 | 15 minutes | ---- | 6 minutes | 15 minutes |
| | 3 miles | | 1 mile | 2 miles |
| Location 3 | 18 minutes | 6 minutes | ---- | 6 minutes |
| | 3 miles | 1 mile | | 1 mile |
| Location 4 | 24 minutes | 15 minutes | 6 minutes | ---- |
| | 4 miles | 2 miles | 1 mile | |

FIG. 2B

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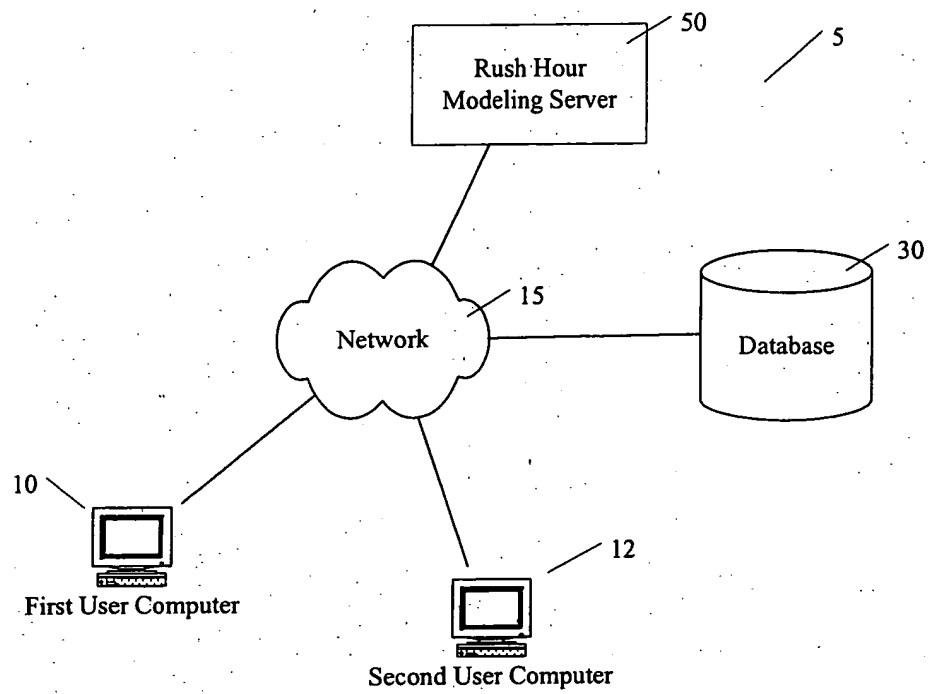


FIG. 3

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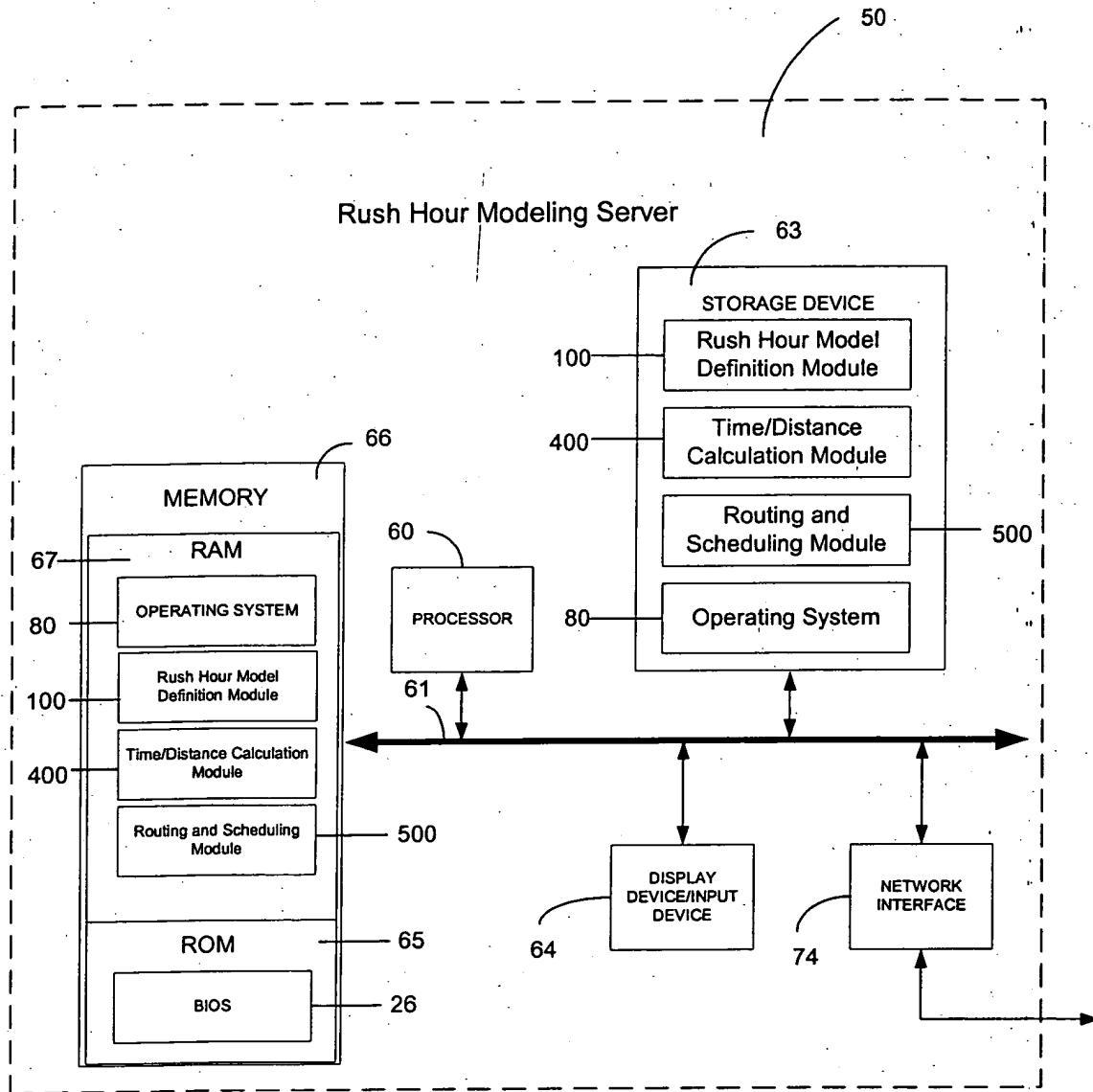


FIG. 4

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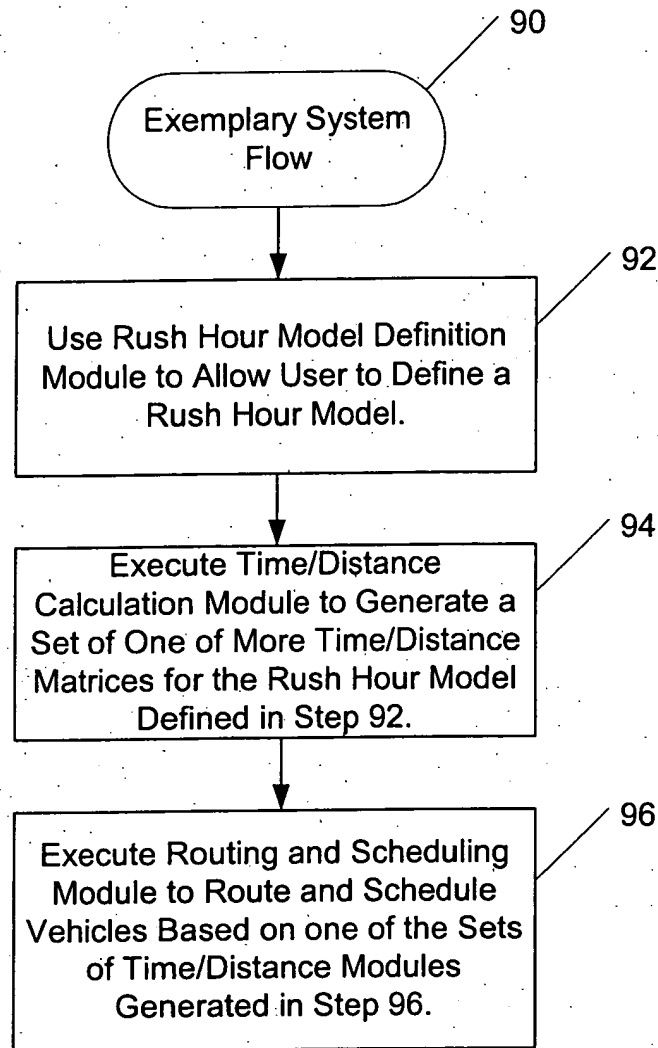


FIG. 5

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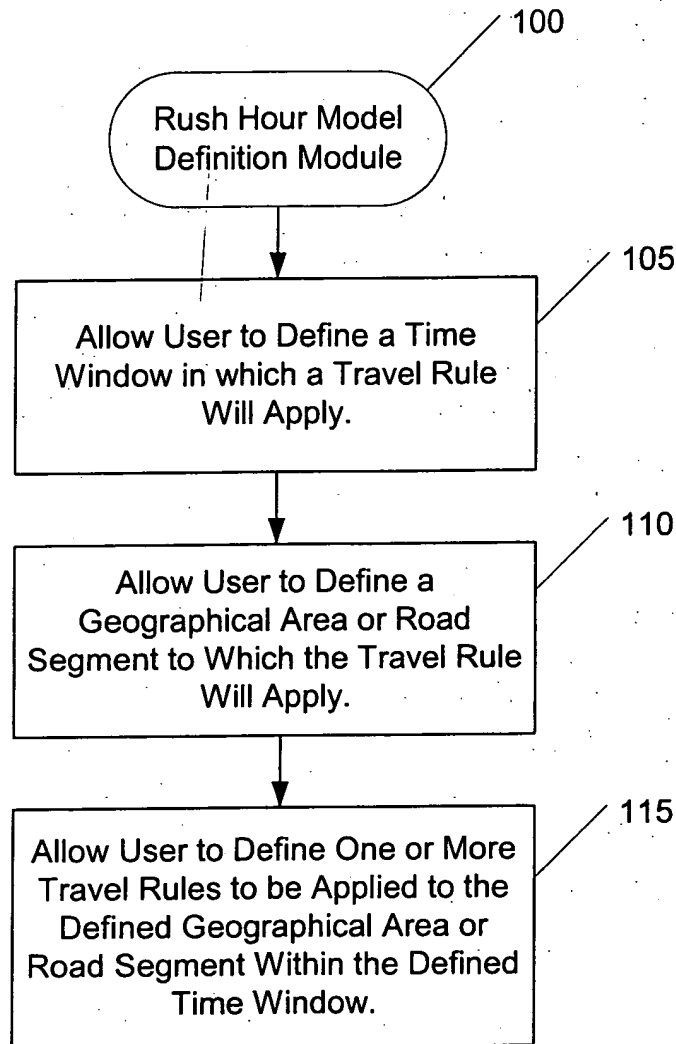


FIG. 6

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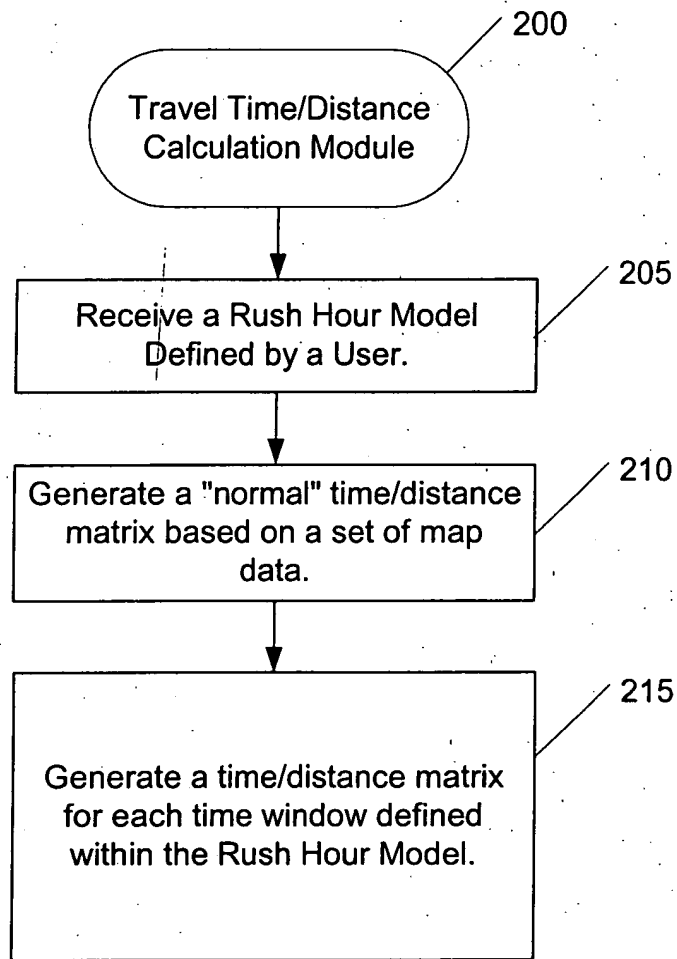


FIG. 7

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606

600

608

610

612

614

616

618

The screenshot shows a software window titled "Edit Rush Hour Model / 1 of 1 record(s)". It contains three sections for defining time periods. The first section, "Time Period 1", is enabled and named "Morning" (608), with a start time of 6:00 (610) and an end time of 9:00 (612). It has a global speed variation of 15% (614) and is set to "Faster" (618). The second section, "Time Period 2", is disabled and named "Midday", with a start time of 11:00 (614) and an end time of 13:00 (616). It has a global speed variation of 0% and is set to "Slower". The third section, "Time Period 3", is enabled and named "Afternoon", with a start time of 16:00 and an end time of 19:00. It has a global speed variation of 25% and is set to "Faster". The status bar at the bottom indicates "Ready" and "Modified by ADMIN on 2/9/2003 19:45".

| Time Period | Name | Start | End | Global Speed Variation | Speed Setting |
|---------------|-----------|-------|-------|------------------------|---------------|
| Time Period 1 | Morning | 6:00 | 9:00 | 15% | Faster |
| Time Period 2 | Midday | 11:00 | 13:00 | 0% | Slower |
| Time Period 3 | Afternoon | 16:00 | 19:00 | 25% | Faster |

Ready Modified by ADMIN on 2/9/2003 19:45

FIG. 8

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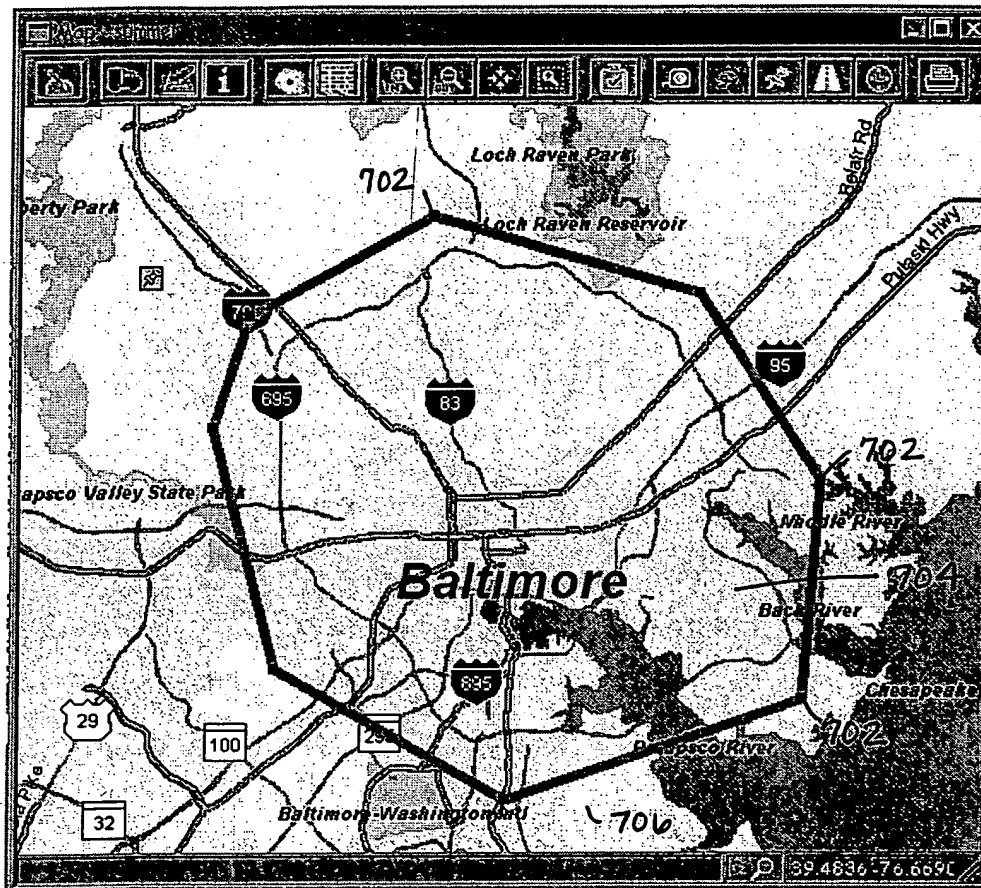


FIG. 9

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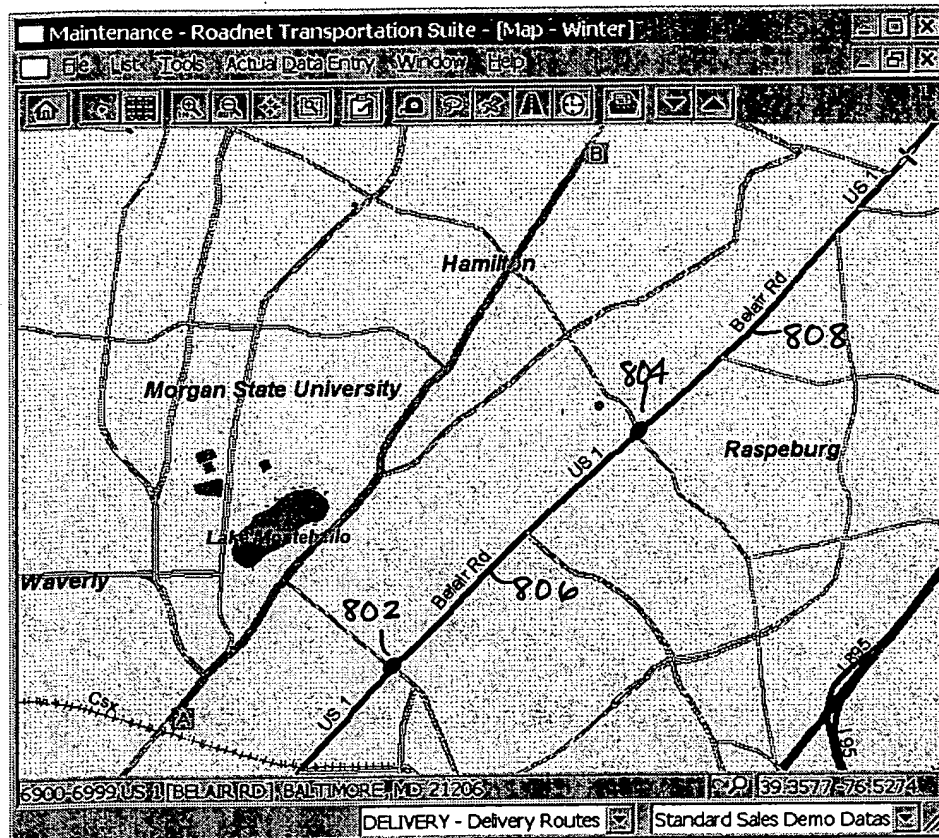


FIG. 10

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Rush Hour Area Attributes - Winter

Name: 902 / Baltimore Description: 916 / Metro Baltimore Priority: 1

☒ Simple ☐ Advanced 905

904 Speed Variation 906 Advanced Speed Variation Travel Restriction

Time Period 1: 06:00 - 09:00 Time Period 2: 16:00 - 19:00 Time Period 3: Not Enabled

Speed Variation: 908 910 40% ☒ Faster ☐ Slower 912 35% ☒ Faster ☐ Slower 0% ☒ Faster ☐ Slower

OK Cancel

900

FIG. 11

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Rush Hour Area Attributes - Winter

Name: Description: Priority:

☐ Simple ☒ Advanced

☒ Speed Variation ☐ Advanced Speed Variation ☐ Travel Restriction

| Road Class | Time Period 1 06:00 - 09:00 | Time Period 2 16:00 - 19:00 | Time Period 3 Not Enabled |
|------------|--|--|--|
| Interstate | <input checked="" type="checkbox"/> 45 <input type="checkbox"/> Faster <input type="checkbox"/> Slower | <input checked="" type="checkbox"/> 40 <input type="checkbox"/> Faster <input type="checkbox"/> Slower | <input type="checkbox"/> 0 <input type="checkbox"/> Faster <input type="checkbox"/> Slower |
| Primary | <input checked="" type="checkbox"/> 30 <input type="checkbox"/> Faster <input type="checkbox"/> Slower | <input checked="" type="checkbox"/> 30 <input type="checkbox"/> Faster <input type="checkbox"/> Slower | <input type="checkbox"/> 0 <input type="checkbox"/> Faster <input type="checkbox"/> Slower |
| Secondary | <input checked="" type="checkbox"/> 20 <input type="checkbox"/> Faster <input type="checkbox"/> Slower | <input checked="" type="checkbox"/> 20 <input type="checkbox"/> Faster <input type="checkbox"/> Slower | <input type="checkbox"/> 0 <input type="checkbox"/> Faster <input type="checkbox"/> Slower |
| Local | <input type="checkbox"/> 10 <input type="checkbox"/> Faster <input type="checkbox"/> Slower | <input type="checkbox"/> 10 <input type="checkbox"/> Faster <input type="checkbox"/> Slower | <input type="checkbox"/> 0 <input type="checkbox"/> Faster <input type="checkbox"/> Slower |

OK Cancel

FIG. 12

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Rush Hour Path Attributes - Winter

Name: I-795 Description: I-795 West

Morning: 06:00 - 09:00 Midday: Not Enabled Afternoon: 16:00 - 19:00

Speed Variation: ☒ 0% ☐ Faster ☒ Slower ☐ 1% ☐ Faster ☒ Slower ☐ 60% ☐ Faster ☒ Slower

Travel Restriction: ☒ Restricted ☐ Restricted ☐ Restricted

Travel Direction: ☒ No Change ☐ Both Ways ☐ One Way A to B ☐ One Way B to A ☐ No Change ☐ Both Ways ☐ One Way A to B ☐ One Way B to A ☐ No Change ☐ Both Ways ☐ One Way A to B ☐ One Way B to A

OK Cancel

1100

FIG. 13

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1201

1200

1204

1206

1212

1210

FIG. 14

General Fleetloader

Type ID: 1

Description: 24 FT ST

General Info

Weight: 0.0000 Height: 9.999.9999

Cost Info

Fixed: 0.0010 Variable: 1.0000

Sizes

| | | Frozen | Dry | Reing |
|--------|--------|--------|-----|-------|
| Cases | 500 | 1 | 0 | 0 |
| Weight | 550 | 2 | 0 | 0 |
| Cube | 12,500 | 3 | 0 | 0 |

☒ Prohibited from Restricted Rush Hour Areas and Paths

Ready Modified by: IFM on 4/25/2000 23:24

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Rush Hour Area Attributes - Winter

Name: Metro Baltimore Description: Area enclosing Belt Beltway Priority: 0

☐ Simple ☒ Advanced

Speed Variation **Advanced Speed Variation** **Travel Restriction**

| | Morning 06:00 - 09:00 | Midday Not Enabled | Afternoon 16:00 - 19:00 |
|-----------------|--|-------------------------------------|--|
| Interstate | <input type="checkbox"/> Restricted | <input type="checkbox"/> Restricted | <input type="checkbox"/> Restricted |
| Primary | <input checked="" type="checkbox"/> Restricted | <input type="checkbox"/> Restricted | <input checked="" type="checkbox"/> Restricted |
| Secondary | <input checked="" type="checkbox"/> Restricted | <input type="checkbox"/> Restricted | <input checked="" type="checkbox"/> Restricted |
| Local and Ramps | <input checked="" type="checkbox"/> Restricted | <input type="checkbox"/> Restricted | <input checked="" type="checkbox"/> Restricted |

1308

1310

1312

A check on this page means restricted equipment types cannot use roads of that class during that time period.

OK Cancel

1300

FIG. 15

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1402

1400

1404

1406

1408

1410

1414

1412

Planned Delivery Date: 2/7/2003

Scenario: DELIVERY

Description: Delivery

Time/Distance Calculation:

- ☒ XY
- ☐ Use Barriers
- ☒ RouteNet
- ☒ Advanced Rush Hour (consider alternative streets)

☒ Combine Orders

☐ DOT Tracking

Valid Delivery Days:

| M | T | W | T | F | S | S |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Rush Hour Model: Winter

Ready Modified by ADMIN on 2/8/2003 10:11

FIG. 16

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1500

| Name | Description | Advanced | User Modified | Date Modified |
|---------|--------------------------------|-------------------------------------|---------------|----------------|
| Holiday | Rush hour for holidays | <input type="checkbox"/> | ADMIN | 2/9/2003 19:46 |
| Summer | Summer rush hour in central MD | <input type="checkbox"/> | ADMIN | 2/9/2003 19:45 |
| Winter | Winter rush hour in central MD | <input checked="" type="checkbox"/> | ADMIN | 2/9/2003 19:54 |

3

FIG. 17